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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/695,726	10/23/2000	Shing M. Lee	KLA1P012	2746

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EXAMINER
FERNANDEZ, KALIMAH

ART UNIT	PAPER NUMBER
2881	

DATE MAILED: 07/08/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application N .	Applicant(s)	
	09/695,726	LEE, SHING M.	
	Examiner	Art Unit	
	Kalimah Fernandez	2881	

-- The MAILING DATE of this communication appears on the c ver she t with th correspondenc address --

Peri d f r Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *02 June 2003* .

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1,2,4,6-9,11,12,14,16-18,21-23,32 and 34-42* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1,2,4,6-9,11,12,14,16-18,21-23,32 and 34-42* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

11)☐ The proposed drawing correction filed on _____ is: a)☐ approved b)☐ disapproved by the Examiner.

If approved, corrected drawings are required in reply to this Office action.

12)☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

13)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____ .

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

14)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).

a) ☐ The translation of the foreign language provisional application has been received.

15)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____ .
4) ☐ Interview Summary (PTO-413) Paper No(s). _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: .

DETAILED ACTION

Claim Rejections - 35 USC § 112

1. The following is a quotation of the first paragraph of 35 U.S.C. 112:

> The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

2. Claims 21-23 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter, which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention. The originally filed specification describes the comparison of predicted data with raw data, but does not disclose or describe such a comparison with collected data as recited in amended claims 21-13. Therefore, this subject matter is considered to be new since it was not presented in the originally specification and amounts to substantive change to the scope of said claims.

Claim Rejections - 35 USC § 102

1. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

;and

> (e) the invention was described in a patent granted on an application for patent by another filed in the United States before the invention thereof by the applicant for patent, or on an international application by another who has fulfilled the requirements of paragraphs (1), (2), and (4) of section 371(c) of this title before the invention thereof by the applicant for patent.

The changes made to 35 U.S.C. 102(e) by the American Inventors Protection Act of 1999 (AIPA) and the Intellectual Property and High Technology Technical Amendments Act of 2002 do not apply when the reference is a U.S. patent resulting directly or indirectly from an international application filed before November 29, 2000. Therefore, the prior art date of the reference is determined under 35 U.S.C. 102(e) prior to the amendment by the AIPA (pre-AIPA 35 U.S.C. 102(e)).

2. Claims 1-2,6,8,32,35,37-39 and 41-42 are rejected under 35 U.S.C. 102(e) as being anticipated by US Pat No 6,351,516 issued to Mazor et al.

3. Mazor et al discloses an apparatus for measuring film stack characteristics of a sample (col.1, lines 4-7).

4. Mazor et al discloses a beam generator configurable to direct a charged particle beam towards the sample (col.5, lines 26-30).

5. Mazor et al discloses penetrating completely two layers of cooper (28,30) for measuring the underlying layer of tantalum (26) (col.6, lines 57-63).

6. Mazor et al discloses a first and second wavelength dispersive X-ray detector (68) positioned above the sample (col.5, lines 42-52; see fig. 4).

7. The recitation " the first detector is configured to detect..... and the second detector is configured to detect X-rays ..." does not constitute a positive limitation in any patentable sense since it only requires the ability to so perform.

8. Therefore, Mazor et al teaching of setting the detection system to measure the intensity of characteristic lines/ emission levels is sufficient to read on the ability to be configured to detect characteristic emission level of

the top layer via a first detector (68) and to detect characteristic emission level of the underlying layer via a second detector (68) (see col.6, lines1-26).

9. As per claims 2 and 8, Mazor et al discloses energy dispersive processing (i.e. art-recognized to detect X-rays of a specific energy level (col.5, lines 42-47)).

10. As per claims 6 and 42, Mazor et al discloses a conductive film layer (28) and a liner film layer (30) (col.6, lines 59-62).

11. As per claim 32, Mazor et al discloses the characteristic emission levels correspond to a different layer of film stack (col.6, lines 59-62). That is, Mazor et al discloses penetrating different layer of the film stack and performance of simultaneous measurement of different layers (i.e. detecting characteristic emission levels from different layer).

12. As per claim 35, Mazor et al discloses the thickness measurement of a top layer of copper and underlying layer (col.5, lines 56-60; col.6, lines 39-45; col.6, lines 59-62).

13. As per claim 37, Mazor et al discloses an apparatus for measuring the thickness of two or more layers within a film stack sample (col.1, lines 1-7; col.1, lines 21-45). In addition, Mazor et al discloses a beam generator

(col.5, lines 26-30) and a detector (68) positioned above the sample so as to detect at least a portion of X-rays emanating from the sample (col. 5, lines 42-60).

14. As per claim 38, Mazor et al discloses the detector (68) being an energy dispersive processing in one embodiment (col.5, lines 20-23;lines 47-50).

15. As per claim 39, Mazor et al discloses the detector (68) being a wavelength dispersive system in another embodiment (col.5, lines 51-52).

16. As per claim 41, Mazor et al discloses a first and second wavelength dispersive X-ray detector (68) positioned above the sample (col.5, lines 42-52; see fig. 4).

17. Claim 37 is rejected under 35 U.S.C. 102(b) as being anticipated by US Pat No 4,162,528 issued to Maldonado et al.

18. Maldonado et al discloses an apparatus for measuring the thickness of two or more layers within a film stack sample (col.2, lines 4-13).

19. Maldonado et al discloses a beam generator configurable to direct a charged particle beam towards the sample such the beam completely penetrates at least two layers of the film stack (col.3, lines 62-65; col. 2, lines 19-22).

20. Maldonado et al discloses measuring multi-layered sample by irradiating the top layer to excite X-ray, then completely penetrating the top layer and subsequent layers to excite X-ray from each underlying layer (col.4, lines 5-26;col.10, lines 63-66).

21. Maldonado et al discloses a X-ray detector (34) positioned above the sample so as detect at least a portion of the X-rays emanating from the source (col.3, lines 31-56).

Claim Rejections - 35 USC § 103

22. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

23. Claim 1-2,4,11-12,14,16-17, 32, 34, and 36-41 are rejected under 35 U.S.C. 103(a) as being unpatentable over Soezima 4,962,516 and in view of US Pat No 5,210,414 issued to Wallace et al.

24. Soezima teaches an apparatus having a beam generator (11) direct a charged particle beam towards a sample (10). Soezima teaches a first and

second wavelength dispersive X-ray detectors positioned above the sample (see fig.5; col.5, lines 15-53).

25. Soezima does not teach causing the charged particle beam to penetrate at least two layers of the film.

26. However, Wallace et al teaches the varying the accelerating voltages of an electron beam to facilitate surface analysis at depths (see col.2, line 56-col.3, line 15;col.4, lines 53-62).

27. Wallace et al teaches the use of wavelength-dispersive X-ray spectrometry for analyzing heavy elements (col.4, lines 65-68).

28. It would have been obvious to an ordinary artisan to combine Soezima and Wallace et al since Wallace et al discloses the ability to differential analyze a sample without causing damage (col.2, lines 12-21).

29. As per claims 1,11 and 36-37, Soezima discloses the first detector detecting X-ray about certain characteristic emission levels and the second about different emission levels (col.5, lines 30-34). While Wallace et al teaching of varying the accelerating voltage for depth analysis reads on causing the beam completely penetrate at least two layer since the control/variation of the accelerating voltage of the beam dictates the penetration depth into the layers of a sample.

30. As per claims 2,12 and 38, Soezima teaches detection of X-rays of specific energy level (col.2, lines 53-60).

31. As per claims 14 and 40, Soezima teaches a reflective surface as recited (col.2, lines 61-65).

32. As per claim 16, Wallace et al teaches selection of a beam acceleration energy and current at which the charged particle beam will be produced (col.5, lines 8-22; col.6, lines 45-52).

33. As per claim 17, Soezima teaches collection and analysis of data from detected X-rays (col.5, lines 53-64).

34. As per claims 32 and 34, Wallace et al teaches differential surface composition analysis (col.2, line 56- col.3, line 15).

35. Claims 6-9, and 18 are rejected under 35 U.S.C. 103(a) as being unpatentable over Soezima and Wallace et al as applied to claim 1 above, and further in view of US Pat No 5,703,361 issued to Sartore.

36. The obvious combination of Soezima and Wallace et al has been discusses except for a processor linked to the beam generator and the first detector. In addition, no discussion of a conductive and liner layer.

37. Soezima teaches a processor (29) operated to store and analyze detected data.

38. Neither, Soezima and Wallace et al teach a processor linked to the beam generator and the first detector.

39. However, Sartore teaches a processor (17) linked to the SEM apparatus (15) (i.e. the beam generator) and a X-ray detector (16) to enable an accuracy determination of the X-ray extraction location (see col.3, lines 21-26, lines 38-50).

40. It would have been obvious to an ordinary artisan to incorporate the teachings of Sartore into the obvious combination of Soezima and Wallace et al.

41. Namely, obvious motivation flows from Sartore's disclosure of advantage of linking the processor to SEM and the detector cited in col.5, lines 7-20. Moreover, Sartore teaches the improved accuracy in image mapping.

42. As per claim 8, Soezima teaches detection of X-rays of specific energy level (col.2, lines 53-60).

43. As per claims 6 and 18 Sartore teaches a conductive layer (12) and an insulation layer (13) (i.e., liner layer) (see col.4, lines 53-60).

Response to Arguments

44. Applicant's arguments with respect to claims 1, 2,4, 6-9,11-12,14,16-18,21-23,32 and 34-42 have been considered but are moot in view of the new ground(s) of rejection.

45. In addition, applicant's argument is not considered persuasive regarding Wallace et al. Applicant asserts that Wallace et al does not teach or suggest a charged particle beam that completely penetrates at least two layers of a film stack. However, Wallace et al teaching of varying the accelerating voltage would implicitly read on the limitation "directing a charged particle beam...such that the charged particle beam completely penetrates at least two layers" since an ordinary artisan knows that the acceleration voltage of the electron beam dictates to a large degree the penetration depth of the beam. Therefore, the teaching of the ability to vary the accelerating voltage would imply the ability to direct a charged beam such that it would completely penetrate layers of a sample (e.g. at least two layers). Furthermore, Wallace teachings a multi-layer sample (col.2, lines 12-21).

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Kalimah Fernandez whose telephone number is 703-305-6310. The examiner can normally be reached on Mon-Thus between 8:30am-6:30pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, John Lee can be reached on 703-308-4116. The fax phone numbers for the organization where this application or proceeding is assigned are 703-872-9318 for regular communications and 703-872-9319 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-308-0956.

kf
June 25, 2003

JOHN R. LEE
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